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(Revision of ANSI/AWWA C655-18)

AWWA Standard

Field Dechlorination

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American Water Works Association

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STANDARD Since 1881

AWWA Standard

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Foreword

This foreword is for information only and is not a part of ANSI/AWWA C655.*

I. Introduction.

I.A. *Background*. This standard describes procedures, materials, and requirements for the dechlorination of chlorinated water discharges or discharges of water treated with chloramines. It includes nonchemical and chemical dechlorination, disinfection and dechlorination planning, dechlorination methods and procedures, and verification.

I.B. *History.* The first version of this standard was approved by the AWWA Board of Directors on June 14, 2009, and the last edition was approved on Jan. 20, 2018. This edition was approved on Mar. 27, 2025.

I.C. *Acceptance*. In May 1985, the US Environmental Protection Agency (USEPA) entered into a cooperative agreement with a consortium led by NSF International (NSF) to develop voluntary third-party consensus standards and a certification program for direct and indirect drinking water additives. Other members of the original consortium included the Water Research Foundation (formerly AwwaRF) and the Conference of State Health and Environmental Managers (COSHEM). The American Water Works Association (AWWA) and the Association of State Drinking Water Administrators (ASDWA) joined later.

In the United States, authority to regulate products for use in, or contact with, drinking water rests with individual states.[†] Local agencies may choose to impose requirements more stringent than those required by the state. To evaluate the health effects of products and drinking water additives from such products, state and local agencies may use various references, including

1. Specific policies of the state or local agency.

2. Four standards developed under the direction of NSF:[‡] NSF/ANSI/CAN[§] 60, Drinking Water Treatment Chemicals—Health Effects; NSF/ANSI/CAN 61, Drinking Water System Components—Health Effects; NSF/ANSI/CAN 372, Drinking Water System Components—Lead Content; and NSF/ANSI/CAN 600, Health Effects Evaluation and Criteria for Chemicals in Drinking Water.

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† Persons outside of the United States should contact the appropriate authority having jurisdiction.

‡ NSF International, 789 North Dixboro Road, Ann Arbor, MI 48105.

§ Standards Council of Canada, 55 Metcalfe Street, Suite 600, Ottawa, ON K1P 6L5 Canada.

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3. Other references, including AWWA standards, *Food Chemicals Codex*, *Water Chemicals Codex,*[¶] and other standards considered appropriate by the state or local agency.

Various certification organizations may be involved in certifying products in accordance with NSF/ANSI/CAN 61. Individual states or local agencies have authority to accept or accredit certification organizations within their jurisdiction. Accreditation of certification organizations may vary from jurisdiction to jurisdiction.

NSF/ANSI/CAN 600 (which formerly appeared in NSF/ANSI/CAN 60 and 61 as Annex A, "Toxicology Review and Evaluation Procedures") does not stipulate a maximum allowable level (MAL) of a contaminant for substances not regulated by a USEPA final maximum contaminant level (MCL). The MALs of an unspecified list of "unregulated contaminants" are based on toxicity testing guidelines (noncarcinogens) and risk characterization methodology (carcinogens). Use of NSF/ANSI/CAN 600 procedures may not always be identical, depending on the certifier.

ANSI/AWWA C655 does not address additives requirements. Users of this standard should consult the appropriate state or local agency having jurisdiction in order to

1. Determine additives requirements including applicable standards.
2. Determine the status of certifications by parties offering to certify products for contact with, or treatment of, drinking water.
3. Determine current information on product certification.

II. Special Issues.

II.A. *US Regulations.*

1. USEPA has established water quality criteria (WQC) for total residual chlorine (TRC) concentrations permissible in receiving waters to protect aquatic life and water quality. These concentrations are based on acute and chronic toxicity effects for aquatic life. Under the acute toxicity criterion, the 1-h average chlorine concentration of the stream should not exceed 0.019 mg/L (19 µg/L) more than once every 3 years, on average. Under the chronic toxicity criterion, the 4-day average concentrations should not exceed 0.011 mg/L (11 µg/L) more than once every 3 years, on average.

Most states in the United States use 0.019 mg/L (19 µg/L) as the acute criterion and 0.011 mg/L (11 µg/L) as the chronic criterion for TRC for receiving streams. Some states have adopted a toxicity-based criterion for water quality for TRC. The

[¶] Both publications available from National Academies Press, 500 Fifth Street, NW, Washington, DC 20001.

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state regulatory agencies require water utilities to abide by the receiving water quality criterion while discharging chlorinated waters. In addition, the regulatory agencies use WQC to develop maximum allowable chlorine concentrations while issuing general or individual permits for discharge of chlorinated water into streams.

2. In addition to residual chlorine concentrations, other water quality parameters may need to be monitored during disposal of chlorinated waters. For example, dechlorination of chloramine residuals may result in the release of ammonia. USEPA has determined the maximum allowable acute and chronic concentrations of ammonia based on the pH, temperature, and the type of aquatic habitat present (warm-water versus cold-water species) in receiving waters. Under the most stringent conditions (cold-water species, pH of 9, 30°C), a 1-day average total ammonia concentration must not exceed 0.58 mg/L as NH_3 and a 4-day average must not exceed 0.08 mg/L as NH_3.

Most states have adopted the USEPA criteria as the water quality standards for ammonia. Water utilities using combined chlorine often maintain a residual chlorine concentration of less than 1.5 mg/L in potable waters, with a chlorine-to-ammonia ratio of 4:1 to 5:1 by mass, which will result in a total ammonia concentration of approximately 0.4–0.5 mg/L. This concentration is less than the acute criterion of 0.58 mg/L for total ammonia under the worst-case scenario. A tenfold dilution of water treated with chloramines in the receiving stream will result in compliance with the chronic ammonia concentration criterion (0.08 mg/L as NH_3) under the most stringent conditions.

For the majority of dechlorination operations, ammonia released from chloramines is likely to be within regulatory requirements. However, some states may have regulations more stringent than the USEPA criteria for selected waters. Caution must be exercised in releasing water treated with chloramines into receiving streams under such conditions.

II.B. *Canadian Regulations.*

1. Canadian Environmental Quality Guidelines (1987) propose a water quality criterion of 0.020 mg/L of total residual chlorine for receiving streams. Many provincial regulatory agencies have adopted this chlorine concentration as the WQC. However, the criteria for chlorine and chloramine concentrations are currently being reviewed under the 1999 water quality guidelines.

Like US states, each province has set its own discharge regulations to dechlorinate before discharge into receiving streams.

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2. In general, the water quality criteria for ammonia, dissolved oxygen, and pH in Canada are similar to those in the United States. For example, in Newfoundland, the pH of the released water should be between 5.5 and 9.0. In Saskatchewan, total ammonia concentrations in the receiving water can be as high as 2.6 mg/L at pH 6.0 and 0°C to as low as 0.06 mg/L at pH 9.0 and 30°C.

Caution must be exercised in complying with ammonia, pH, and dissolved oxygen regulations during dechlorination activities.

II.C. *Determination of Method for Dechlorination*. Development of a Disinfection and Dechlorination Plan is needed for work performed under standards ANSI/AWWA C651 (Disinfecting Water Mains), ANSI/AWWA C652 (Disinfection of Water Storage Facilities), ANSI/AWWA C653 (Disinfection of Water Treatment Plants), and ANSI/AWWA C654 (Disinfection of Wells). The method of dechlorination should be determined by the performance requirements dictated by site-specific conditions. Other issues such as the impact of dechlorination on dissolved oxygen and pH may also be of concern, depending on the quantities involved and the operational characteristics of the dechlorinating equipment. For all practical purposes, nonchemical dechlorination is limited to low chlorine discharges. Where it can be used, it is the least costly method. Chemical dechlorination methods and equipment differ in capability, and the purchaser must confirm the proposed equipment meets the discharge requirements. For information regarding equipment to apply dechlorination chemicals, refer to Appendix C. The dechlorination method must meet all applicable chlorine residual discharge limits after accounting for dilution in the receiving water. The entire volume of discharged water must meet mixing, reaction time, and residual chlorine concentration requirements.

II.D. *Chemical Handling Precautions.* The chemicals used for dechlorination can cause skin, eye, nose, throat, and lung irritation. Personnel are advised to use caution and to wear protective clothing (including, but not limited to, gloves, apron, goggles, and a suitable vapor mask) when handling the chemicals. Refer to the manufacturers' safety data sheets (SDS) for information on specific hazards and procedures for the proper storage and handling of each chemical.

III. Use of This Standard. It is the responsibility of the user of an AWWA standard to determine that the products described in that standard are suitable for use in the particular application being considered.

III.A. *Purchaser Options and Alternatives*. This standard is written as though the dechlorination work will be performed by the purchaser's personnel. Where the

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work is to be done for a separate contract or as part of a contract for installing mains,** appropriate provisions should be included in the purchase documents to ensure that the contractor is specifically instructed concerning the contractor's responsibilities. The following items should be provided by the purchaser:

1. Standard used—that is, ANSI/AWWA C655, Field Dechlorination, of latest revision.
2. Whether compliance with NSF/ANSI/CAN 61, Drinking Water System Components—Health Effects, is required.
3. Approval requirements before use.
4. Those procedures included in the standard, which are designated as optional, that are to be included in the purchase documents.
5. Method of dechlorination.
6. Flushing locations, rates of flushing, and locations of drainage facilities.
7. Responsibility for tapping existing mains and connections to new mains.
8. The number and frequency of samples for bacteriological tests.
9. Details of federal, state, provincial, territorial, and local requirements (Sec. 4.1).
10. Method of testing for residual chlorine (Sec. 5.2).

III.B. *Modification to Standard*. Any modification of the provisions, definitions, or terminology in this standard must be provided by the purchaser.

IV. Major Revisions. Major revisions made to the standard in this edition include the following:

1. A requirement for preparing a Disinfection and Dechlorination Plan was added to the foreword (II.C) and the revised Sec. 4.3; and guidance was added in new Appendix A. Previous Appendix A was renamed Appendix B.
2. A new Sec. II.D Chemical Handling Precautions was added to the foreword.
3. The Scope, Purpose, and Application sections were revised to clarify use for field dechlorination only, and the Scope now includes examples of the types of water discharges where this standard may be applicable (Sec. 1.1, Sec. 1.2, and Sec. 1.3).
4. The definitions for *chloraminated water*, *loss of control*, and *low-chloraminated water* were removed, and definitions for *chloramines*, *oxygen scavenger*, and *reclaimed water* were added. The terms and definitions for *free chlorine* and *total residual chlorine* were clarified. The definitions for *highly chlorinated water* and *low-chlorinated water*

** Refer to other AWWA standards and manuals for design criteria and installation procedures for various pipe materials.

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were clarified, and variations of this terminology were edited throughout the standard for consistency.

5. A new nonchemical dechlorination subsection, 4.2.2.1 Dilution and Fast Reactions in Receiving Water, was added and the remaining subsections renumbered.

6. Treatment chemicals that deplete oxygen and are otherwise not well suited for dechlorination in the field (sulfur dioxide, sodium sulfite, sodium bisulfite, and sodium metabisulfite) were removed (Sec. 4.2.3 and Table A.3 [now Table B.1]).

7. The field methods for measuring residual chlorine levels in Sec. 5.2 were clarified and corrected as required. Titration is not a suitable method for the field and was replaced with portable chlorine meters (Sec. 5.2.1.3).

8. The chemical reaction tables were deleted from former Appendix A (now Appendix B).

9. Field dechlorination equipment previously covered in Sec. 4.4 were moved to Appendix C.

V. Comments. If you have any comments or questions about this standard, please call AWWA Engineering and Technical Services at 303.794.7711, write to the department at 6666 West Quincy Avenue, Denver, CO 80235-3098, or email standards@awwa.org.

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ANSI/AWWA C655-25
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AWWA Standard

Field Dechlorination

SECTION 1: GENERAL

Sec. 1.1 Scope

This standard describes procedures, materials, and requirements for field dechlorination of chlorinated water discharges or discharges of water treated with chloramines such as may occur from pipeline disinfection projects, hydrant flow testing, tank or pipeline draining or flushing, or distribution system maintenance flushing programs, when dechlorination is required.

Sec. 1.2 Purpose

The purpose of this standard is to define the minimum procedures for field dechlorination of chlorinated water or water treated with chloramines that is to be discharged, including discharge site preparation, sampling and testing of discharge water, various methods of dechlorination, and dechlorination chemicals.

Sec. 1.3 Application

This standard can be referenced in specifications for field dechlorination of chlorinated water or water treated with chloramines that is to be discharged into the environment. The stipulations of this standard apply when this document has been referenced and then only to field dechlorination. The dechlorination operation shall comply with applicable permit or regulatory requirements, as per Sec. 5.1.1.

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